

CLAIMS

- Add b/a!*
1. Apparatus for cold forging a metal workpiece, characterised by a die (6) and by the die (5, 6) having means (8, 8') to alleviate stress to the workpiece during forging.
 2. Apparatus for enlarging part of a metal workpiece by cold forging, characterised by an enlarging die (5, 6) and by the die having means (8, 8') to alleviate stress to the workpiece during forging.
 3. Apparatus according to Claim 1 or Claim 2, characterised by the stress alleviating means (8, 8') comprising an enlarged die part into which metal can flow during forging.
 4. Apparatus according to Claim 3, characterised by the enlarged die part comprising a substantially U-shaped groove (8') in the die (5, 6).
 - ~~5.~~ Apparatus according to Claim 3 or Claim 4, characterised by there being two opposed dies (5) and (6).
 - ~~6.~~ Apparatus according to Claim 5, characterised by each die (5, 6) having a first die part (9) and a second die part (8), which second die part (8) is enlarged relative to the first die part (9) to form the means (8') and is adapted to allow part of the workpiece to project therefrom, the arrangement being such that in use the projecting part of the workpiece is upset and enlarged.
 - ~~7.~~ Apparatus according to Claim 6, characterised by means (11) to press the die parts together, and by means (12) to apply pressure in a

direction substantially at 90° to the first-mentioned press direction.

8. Apparatus according to Claim 7, characterised by the means (11) for pressing the die parts together comprising an hydraulic press acting substantially vertically in use.

9. Apparatus according to Claim 7 or Claim 8, characterised by the second-mentioned means (12) comprising an hydraulic press acting substantially horizontally.

10. Apparatus according to Claim 9, characterised by at least the distance between the enlarging die (5, 6) and the substantially-horizontally acting hydraulic press (12) being adjustable.

11. Apparatus according to Claim 10, characterised by the distance being adjustable by adjusting the pressure of a forging piston (13) for effecting forging.

12. Apparatus according to Claim 11, characterised by the distance being adjustable by adjustment of a forging pad (14) on which the forging piston (13) can act.

13. Apparatus according to any of Claims 9 to 12, characterised by the pressure of the substantially vertically acting hydraulic press (11) being adjustable.

14. Apparatus according to any of Claims 6 to 13, characterised by the first die part (9) having an internal die configuration substantially complementary to the external configuration of a major part of a

workpiece which is to be forged.

15. A method of cold forging an elongate metal workpiece, characterised by the steps of providing forging apparatus (1) having a die (5, 6), by providing the die (5, 6) with means (8') to alleviate stress in the workpiece during forging, and by forging the workpiece.

16. A method according to Claim 15, characterised by the method including the steps of providing two opposed forging dies (5, 6).

17. A method according to Claim 16, characterised by each forging die (5, 6) comprising a relief channel for receiving a rib of a workpiece (2).

18. A method according to Claim 17, characterised by including the steps of providing that each die part (5, 6) has a first die part (9) and a second die part (8) enlarged with respect to the first die part (9), inserting an elongate workpiece (2) between the dies (5, 6) so that the first die part receives a main part of the workpiece (2), and by an end of the workpiece projecting through and beyond the second die part (8), and by upsetting the projecting end so that it flows into the enlarged second die part (8).

19. A method according to Claim 18, characterised by including the steps of removing the forged workpiece (2) from the apparatus and forming a thread on the enlarged part (2a) of the workpiece (2).

20. An elongate metal workpiece whenever forged by apparatus according to any of Claims 1 to 14, or whenever produced by a method

according to any of Claims 15 to 19.

~~21.~~ An elongate metal workpiece according to Claim 20, characterised by having at least one threaded end.

~~22.~~ An elongate metal workpiece according to Claim 21, characterised by being reinforcing bar (2) for use in building construction.

~~23.~~ A reinforcing bar according to Claim 22, characterised by having an internally threaded sleeve (19) on an end opposite an enlarged threaded end.

~~24.~~ A reinforcing system, characterised by a plurality of reinforcing bars (2) according to any of Claims 22 or 23.

~~25.~~ Concrete whenever reinforced by a workpiece or reinforcing bar according to any of Claims 22 to 24.

26. A die for use in cold forging a metal workpiece, characterised by means (8') to alleviate stress to the workpiece during forging.

27. A die according to Claim 26, characterised by the means (8') comprising an enlarged U-shaped groove part of a die (5) or (6).